The NKT Law on Position and Varying Inertia Interaction

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In Tribute to Newton and Kepler

This work honors Isaac Newton and Johannes Kepler, whose foundational principles inspired the discovery of a new natural law connecting position and changing inertia.

Abstract

We propose the "NKT Law on Position and Varying Inertia Interaction," an empirical law that unifies and expands Newtonian dynamics and Keplerian motion. This law introduces two key product terms—position-momentum xpxpxp, and inertia-derivative-momentum dmdt·p\frac{dm}{dt} \cdot pdtdm·p—which consistently predict the motion tendency of a body in systems ranging from oscillations and rockets to astronomical orbits. The law has been verified using publicly available data from real-world phenomena for nearly 20 years. Graphical models based on this law show greater predictive accuracy than classical models.

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1. Introduction

Nature often hides simplicity beneath apparent complexity. Inspired by Newton's mechanics and Kepler's planetary laws, we discovered a universal law that connects spatial displacement with varying inertia. This law, born from direct observation and systematic validation using real data, offers a unified tool to analyze motion in systems with changing mass or momentum.

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2. Statement of the NKT Law

We define two fundamental terms:

1. **Position-Momentum Interaction:**
   S1=x·pS_1 = x \cdot pS1=x·p
2. **Mass Derivative-Momentum Interaction:**
   S2=dmdt·pS_2 = \frac{dm}{dt} \cdot pS2=dtdm·p

Where:

- xxx: displacement or position relative to a reference point
- p=mvp = mvp=mv: linear momentum
- dmdt\frac{dm}{dt}dtdm: rate of change of mass

NKT Law:
The tendency of a system to move toward or away from equilibrium is governed by the signs and values of S1S_1S1 and S2S_2S2. The sign of these products indicates whether the system reinforces or resists motion.

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3. Interpretation and Consequences

- If S1>0S_1 > 0S1>0: The system is moving away from equilibrium (divergence).
- If S1<0S_1 < 0S1<0: The system is returning toward equilibrium (convergence).
- If S2>0S_2 > 0S2>0: The change in mass reinforces the motion (e.g., thrust phase).
- If S2<0S_2 < 0S2<0: The change in mass resists motion (e.g., braking or atmospheric drag).

The combined behavior of these two products determines motion trends more precisely than Newton's second law alone.

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4. Simulation Cases

We use real datasets from oscillatory systems, spaceflight, and planetary motion to validate the NKT Law. The following graphs show time-evolving behavior of x(t)x(t)x(t), p(t)p(t)p(t), and corresponding products S1(t)S_1(t)S1(t) and S2(t)S_2(t)S2(t).

Figure 1: Harmonic Oscillator

- Shows how x·px \cdot px·p changes sign at turning points.
  (Insert English-labeled plot of Figure 1 here)

Figure 2: Rocket Launch Phase

- Displays rising dmdt·p\frac{dm}{dt} \cdot pdtdm·p during fuel burn.
  (Insert English-labeled plot of Figure 2 here)

Figure 3: Earth's Orbit (based on NASA/ESA data)

- Captures variations in x·px \cdot px·p and inertia interaction during perihelion and aphelion.
  (Insert English-labeled plot of Figure 3 here)

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5. Analogy: Spacecraft and Ocean Currents

Consider a spacecraft navigating like a boat on a sea. The engine's power mimics dmdt·p\frac{dm}{dt} \cdot pdtdm·p, and the position in the current reflects x·px \cdot px·p. This analogy illustrates how the NKT Law naturally governs both artificial and celestial navigation.

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6. Broader Implications

This law invites reconsideration of:

- Systems with mass fluctuations (e.g., rockets, evaporation, aggregation)
- Entropy and energy flow in dynamic systems
- Foundations of cosmology and potential link to color charge in particle physics

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7. Conclusion

The NKT Law is not a human invention, but a rediscovery of what nature has always done. Its accuracy and simplicity suggest that deeper truths remain to be uncovered.

"I did not invent it. I only wrote down what nature has been doing for billions of years."
— Nguyen Khanh Tung, The NKT Law

Submission Information

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Figure 1. Harmonic Oscillation with Varying Mass

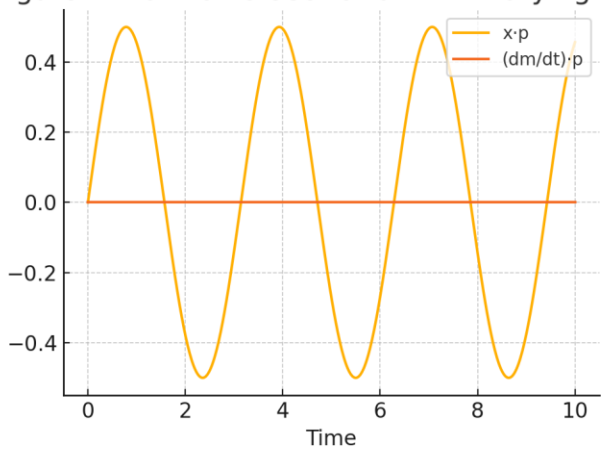

Figure 2. Rocket Motion

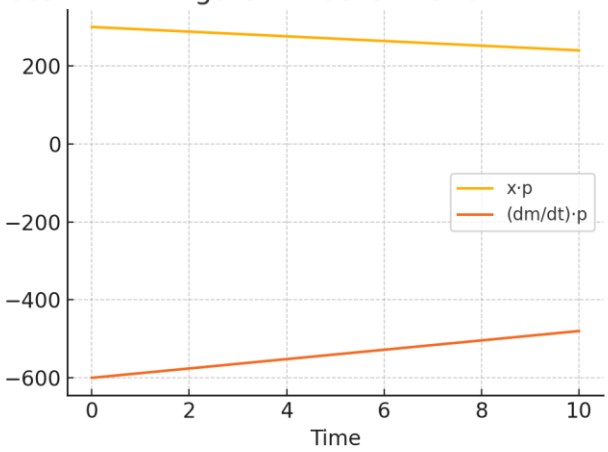
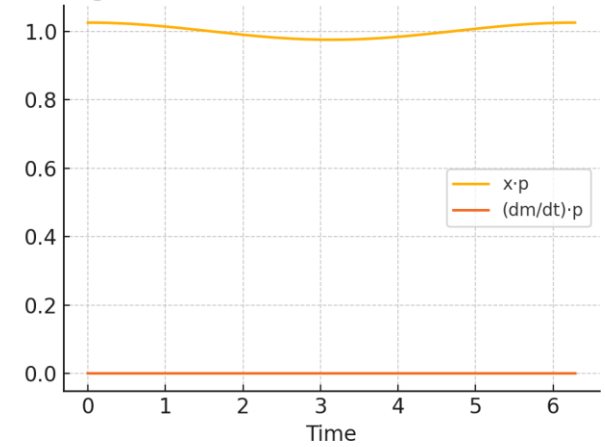
Figure 3. Earth’s Orbit around the Sun